

## Evaluation of Nuclear Data at LBNL\*

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An important activity of the Isotopes Project is to compile and evaluate nuclear structure and radioactive decay data. The group, which coordinates its work with both the national and international data networks, has had responsibility for the evaluation of all the nuclides with mass numbers  $A = 81, 83, 89-93, 167-194, 206, 210-212, 215, 219, 223, \text{ and } 227$ .

The Isotopes Project published in *Nuclear Data Sheets* mass-chain evaluations for  $A=89, 135, 176$ , and  $192$ , as well as those for the individual nuclides  $^{170}\text{Ta}$ ,  $^{170}\text{Lu}$ , and  $^{179}\text{Ir}$  during the 1998 calendar year. The evaluation for each individual nuclide included an *Adopted* data set of recommended values, as well as other sets of data from separate or combined experiments. Updated evaluations for  $^{81}\text{Y}$ ,  $^{81}\text{Sr}$ ,  $^{92}\text{Rh}$ ,  $^{92}\text{Ru}$  and  $^{186}\text{Hf}$ , also produced by the Isotopes Project, have not been published yet. However, after going through the review process, they were incorporated into the *Evaluated Nuclear Structure Data File* (ENSDF, a computer file of evaluated experimental nuclear structure and decay data maintained by the National Nuclear Data Center (NNDC) at BNL).

Also, a large number of data sets for individual nuclides (a byproduct of the work for the update of the 8<sup>th</sup> Edition of the *Table of Isotopes*, John Wiley & Sons, Inc., 1998) were incorporated into ENSDF. These data sets included information on nuclides far from stability (about 47), on radioactive decay (about 23), and on spontaneous fission (about 27), none of which was previously in ENSDF.

The Isotopes Project is a member of a separate international collaboration with nuclear scientists from France, Germany, the United Kingdom, Russia, and the United States. This collaboration focuses its evaluation effort on data from radionuclides specifically used in applied research and detector calibrations, and often suggests new measurements for values that are unsatisfactory. Uniformity of data analysis and reproducibility of recommended values are the main goals in these evaluations; these goals have been achieved by using well-established

procedures. The evaluations for the following radionuclides are completed or near completion:

$^3\text{H}$ ,  $^7\text{Be}$ ,  $^{14}\text{C}$ ,  $^{22}\text{Na}$ ,  $^{24}\text{Na}$ ,  $^{26}\text{Al}$ ,  $^{35}\text{S}$ ,  $^{36}\text{Cl}$ ,  $^{40}\text{K}$ ,  $^{41}\text{Ar}$ ,  $^{44}\text{Ti}$ ,  $^{46}\text{Sc}$ ,  $^{51}\text{Cr}$ ,  $^{54}\text{Mn}$ ,  $^{55}\text{Fe}$ ,  $^{57}\text{Ni}$ ,  $^{58}\text{Co}$ ,  $^{60}\text{Fe}$ ,  $^{60}\text{Co}$ ,  $^{65}\text{Zn}$ ,  $^{68}\text{Ga}$ ,  $^{68}\text{Ge}$ ,  $^{75}\text{Se}$ ,  $^{85}\text{Sr}$ ,  $^{95}\text{Zr}$ ,  $^{95}\text{Nb}$ ,  $^{95\text{m}}\text{Nb}$ ,  $^{109}\text{Cd}$ ,  $^{111}\text{In}$ ,  $^{113}\text{Sn}$ ,  $^{123\text{m}}\text{Te}$ ,  $^{125}\text{I}$ ,  $^{137}\text{Cs}$ ,  $^{137\text{m}}\text{Ba}$ ,  $^{139}\text{Ce}$ ,  $^{140}\text{Ba}$ ,  $^{140}\text{La}$ ,  $^{141}\text{Ce}$ ,  $^{143}\text{Pr}$ ,  $^{153}\text{Sm}$ ,  $^{153}\text{Gd}$ ,  $^{186}\text{Re}$ ,  $^{188}\text{Re}$ ,  $^{192}\text{Ir}$ ,  $^{194}\text{Ir}$ , and  $^{207}\text{Bi}$ . Those for  $^{26}\text{Al}$ ,  $^{44}\text{Ti}$ ,  $^{57}\text{Ni}$ ,  $^{60}\text{Fe}$ ,  $^{75}\text{Se}$ ,  $^{188}\text{Re}$ ,  $^{192}\text{Ir}$ , and  $^{194}\text{Ir}$  are from the Isotopes Project.

Most of these evaluations have been included in *NUCLEIDE*, a new CD-ROM released by the Laboratoire Primaire des Rayonnements Ionisants (LPRI), Saclay, France, in December 1998. In addition, all the evaluations will be used in the publication of the *Table of Radionuclides*, by Laboratoire Primaire des Rayonnements Ionisants (LPRI), and Physikalisch-Technische Bundesanstalt (PTB), an extension of the *Table de Radionucléides* [1]. Ultimately, the data will become part of ENSDF, and also will be submitted to the International Atomic Energy Agency (IAEA) for inclusion in its database on radioactive decay.

### Footnotes and References

1. F. Lagoutine, N. Coursol, and J. Legrand, "Table de Radionucléides," ISBN-2-7272-0078-1 (LMRI, 1982-1987).